THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

SEC ISSUES

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held at the Marriott Airport, Hebron, Kentucky, on January 17, 2007.

C O N T E N T S

January 17, 2007

TRANSCRIPT LEGEND

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-- (sic) denotes an incorrect usage or pronunciation of a word which is transcribed in its original form as reported.

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-- "uh-huh" represents an affirmative response, and "uh-uh" represents a negative response.

-- "*" denotes a spelling based on phonetics, without reference available.

-- (inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone.

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P R O C E E D I N G S

(10:00 a.m.)

WELCOME AND OPENING COMMENTS

DR. LEW WADE, DFO

DR. WADE: This is a work group of the Advisory Board. This is the work group on SEC issues, including the 250 day issue and the preliminary review of 83.14 SEC petitions. That work group is ably chaired by Dr. Melius, members Ziemer, Roessler and Griffon. We'll introduce ourselves around the table, but Drs. Melius, Ziemer and Roessler are here.

Mark Griffon, are you on the line?

MR. GRIFFON (by Telephone): Yes.

DR. WADE: Good. I know that Robert Presley is also on the line. He's invited because of the overlap between his work group related to the Nevada Test site and the 250 day issue. Are there any other Board members on this call other than Mark and Robert? Any other Board members on the call?

(no response)

Well, we don't have a quorum of the Board which means we can continue with our

business of the work group.

I would ask if there are any SC&A employees on the call that you identify yourself.

DR. MAURO (by Telephone): Yes, John Mauro.

DR. WADE: Welcome, John.

DR. BEHLING (by Telephone): Hans Behling.

DR. WADE: Welcome, Hans.

Anyone else from SC&A on the call?

(no response)

DR. WADE: Anyone from the NIOSH/ORAU team on the call?

(no response)

DR. WADE: NIOSH/ORAU team?

MS. CHANG (by Telephone): Chia-Chia Chang with the NIOSH Director's office.

DR. WADE: Any other federal employees who are on the call by virtue of their federal employment?

MS. HOMOKI-TITUS (by Telephone): This is Liz Homoki-Titus with Health and Human Services.

DR. WADE: Welcome, Liz.

MR. KOTSCH (by Telephone): Jeff Kotsch, DOL.

DR. WADE: Jeff, always a pleasure.

MR. BROEHM: Jason Broehm, CDC, Washington office.

DR. WADE: Welcome, Jason.

Are there any worker reps, petitioners, people involved in the process who would like to be identified as participating?

(no response)

DR. WADE: Anyone who would like to be introduced?

(no response)

DR. WADE: Okay, Jim, you've got it okay from here.

DR. MELIUS: Go around the table? Jim Melius, a member of the Advisory Board.

DR. MAKHIJANI: Arjun Makhijani, SC&A.

MR. ELLIOTT: Larry Elliott, NIOSH.

MR. RUTHERFORD: LaVon Rutherford, NIOSH.

DR. WADE: Lew Wade with NIOSH and the Advisory Board.

MS. HOWELL: Emily Howell, HHS.

DR. ROESSLER: Gen Roessler, Advisory Board.

DR. NETON: Jim Neton, NIOSH.

DR. ZIEMER: Paul Ziemer, Advisory Board.

DR. WADE: We're done, and I would ask you all to just remember practice good phone courtesy. Mute the phone if you're participating. Use the hand set as opposed to the speaker phone. Be mindful of background music on your line when you put the phone on hold. We've experienced all of those things, and we'd rather not experience them again. Thank you.

Jim.

DR. MELIUS: Just to give people a sense of the agenda for the day, what I thought we would start out with talking about the Ames report. Then we would move on to the recent report on the Nevada Test Site, and then, those are sort of the 250 day portions of this meeting. And then the second portion of the meeting will deal with the 83.14 issue. And in that case we'll be using as examples for discussion the General Atomics and the Monsanto reports that we reviewed at the last meeting.

I talked to Larry about a week ago, ten days ago, and there were at that time no 83.14's and sort of in position to be

presented shortly that we would, were sort of available for discussion. So I thought we could at least be helpful to discuss those other two. And Mark Griffon and I have done some follow up on those so I think we have a sense of some of the issues related to that. So that will be sort of the third portion of the meeting.

AMES REPORT

And maybe to start out, I'm not sure who wants to present the Ames report. This is something --

DR. MAKHIJANI: Hans, I think.

DR. MELIUS: Okay, go ahead, Hans. Do you want to just sort of briefly describe the report and sort of walk us through and then the conclusions?

DR. BEHLING (by Telephone): Yeah, as you know, our original draft report that actually looked at the SEC covered some of the issues that I covered in the most recent report. And in this recent report it just simply amplified some of the earlier observations and comments. Among the things that are included in this report is an interview with who was

a former worker at the Ames Laboratory. He was a person who apparently worked there for a period of years starting either in or . He doesn't know the exact date, but it does cover the timeframe during which the thorium reduction process was in full swing and obviously his comments speak for themselves.

In addition, I was also able to obtain from the ISU, that is the Iowa State University archives, a copy of an interview with where he, again, personally validates the claim that was initially identified as a reference in the Dr. Payne's doctoral thesis involving the bombs and explosions and fires, the issue of the frequency, and of course, the involvement of workers who were asked to put out the fires.

One of the major issues here is the duration of exposure involving people who may have been party to these explosions and fires. I think early on the assumption was that people's good sense would have them running out the door immediately and minimizing their time period for exposure. That apparently was not the case for multiple reasons.

One, the people there were expected to participate in the putting out of these fires because of the classified nature of the work which precluded the use of local firemen to come in there and control the fires.

The other thing was the frequency by which these fires occurred, or explosions occurred, to the point where people became extremely insensitive to these things because of their frequency. And in my interview with it was clear that the frequency numbed these people to the sense where they just continued working if they weren't directly involved in the fire.

So we have frequent events that are certainly classified as radiological events. And we have people who were exposed to these events for extended periods of time, meaning that it's likely that their exposures were substantial and these exposures happened routinely.

DR. MAKHIJANI: You mean routinely as a result, not routinely but rather as a result of frequent incidents.

DR. BEHLING (by Telephone): Yes. I don't

want to say this is a routine radiological environment, meaning that these events did occur frequently in a sense where virtually anybody who was potentially exposed for much less than 250 days would have been a participant, a passive participant, in these events at some point in time.

Also, let me add that there was an appendix in the report, and I added this appendix. It comes from one of the documents I received from the library that acknowledges workers, and the point of that particular appendix is to acknowledge the fact that there were probably substantial numbers of people who may have been employed for periods less that 250 days.

And the appendix you see in the most recent draft report involves workers who were not production workers but scientists, staff members, people who worked during that period of time early on uranium period from about ’42 to ’47 or something like that. And what you can extract from that information is that among the professional staff there were about, I believe, about 22 people who were employed

for periods of less than 250 days. Now I would consider these people a smaller fraction from the total workforce when you include production workers.

What the point of this is is that if you were to include production workers, you would probably have a substantial number of people who were probably employed for less than 250 days, and therefore, potentially exposed to these events. In fact, the numbers of people that you saw identified as people who may have been exposed to these events but were less than 250 days were people who were awarded a bronze pin.

And there were three levels of awards: gold, silver and bronze pins. And of course, the bronze pins involved people who had the shortest duration of employment. These people are not process workers; and therefore, I suspect that there are quite a few numbers of people.

And again, we've heard from Dr. Neton earlier that the number of people who might be eligible are few. However, that number does not include our potential people who may have

realized that their employment period was less than 250 days which excludes them from even applying. And therefore, we're not necessarily looking at the correct number of people who may be affected by this rule.

DR. NETON: This is Jim Neton. I guess if I could chime in. A couple thoughts on Hans' introductory remarks. One is it's not clear to me that the frequency of these events is relevant to the evaluation of the 250 day exposure period. Frequency in and of itself doesn't speak to exceptionally high exposures which is really the litmus test, I think, in the regulation. We can have many routine frequent exposures and do they rise to the level of something equivalent to a criticality event. I mean, those are the criteria we really have to, I think, evaluate.

The second issue was those non-production workers who have had less than 250 days, it's not clear in my mind that, you know, if you're going to define a class for less than 250 days, you have to put your hands around it. And I don't know that non-production workers, who were not in the plant

itself maybe when these events occurred, were actually exposed. That would have to be fully fleshed out and investigated. But you identified a population of less than 250 days but those would have had to be bounced against a class that was identified as potentially having these exceptionally high exposures.

DR. MELIUS: But I think the frequency of the incidents, I think, doesn't necessarily sort of meet the health endangerment criteria itself although what it does point out to is that the difficulty of, the fact that many different people may have been exposed. We're dealing with a situation where we have almost no monitoring data.

We have no incident reports, and we're going back so far in time I doubt if we have very good ability to use personal recollection or interviews with claimants in order to be able to have them affirm one way or the other what kind of incident were they present at and so forth. And I agree that I think the crux of the, in my mind when I say, you know, I'm convinced that some number of people at this facility were exposed to a significant amount

of radiation in a short period of time.

We can't reconstruct the dose for those incidents. I think that the crux of the issue, the harder part is what you pointed out, Jim, is how do you then define a class that includes this. I think in the circumstance of given how little data there is, is it fair to put the burden on the claimants to prove that, to prove that they were exposed? Because, I mean, there's just no ability, even if they make a claim, even if a person's alive and says, you know, fit the criteria less that 250 days, was present and so forth.

We have no ability to really affirm that or I should say maybe confirm that from records and even the practicality of coworker information. I mean, I agree with you, I guess one could think of a situation where someone would have very incidental exposure there from this list of people that worked there 250 days. But we have no good way of separating out one from the other.

DR. BEHLING (by Telephone): And Dr. Melius, can I interject something here?

DR. MELIUS: Yes.

DR. BEHLING (by Telephone): Regarding the frequency, and I think the point here that needs to be made is that if you can reasonably assume that these kinds of incidents happened throughout the full duration from '42 to '53 or even beyond that, one doesn't -- let's assume that there was only a single event, then of course, the 250 day criteria would only apply to those people who were on either side of that event in terms of being hired.

Since the fact that we can reasonably conclude that these events happened almost routinely over -- or I should stop using the word routine, but frequently throughout the whole period virtually meaning that every person who was there for periods of even from a few weeks to a couple months or so, would have been potentially affected by these events.

And therefore, the SEC class that might include the less than 250 day employment period issue would affect virtually everybody from the start of the project to the end of the project. And I think that's the point I

wanted to make here.

DR. NETON: I understand that, Hans, but you really do have to keep going back and thinking about is an individual incident that you described sufficiently exceptionally high equivocal criticality. I mean, that's the way the regulation reads.

DR. BEHLING (by Telephone): Well, you can come to that conclusion, Jim, when you look at the size of these volumes that in some instances were many, many kilograms. And the area in which these events took place were relatively small so that you're not talking about a huge facility, that the air concentrations would have been very, very high.

And of course, it would have involved everything from very small particles to large pieces of particles that a person might have been subjected to in the process of putting out the fire or dealing with it or just simply keeping on working. So at this point we're not in a position to reconstruct the exposures other than to say that they were probably very high airborne concentrations and the duration

of exposure would have been potentially fairly extensive.

DR. MELIUS: Gen.

DR. ROESSLER: I think you're hitting on the point that I have a question about it. I know we don't have dosimetry or anything, but it seems somebody could develop a scenario for that situation. How much could have been released in that environment over a short period of time, and what would be the impact then on doses.

I mean, I have no feeling when you said probably high exposures, I have no feeling for what that means. I think you have to take into consideration the radioactive material, the dose I would assume would be to the lung, and come up with some number that would help us evaluate it.

DR. BEHLING (by Telephone): Well, we could possibly look at a single event. We have some understanding of how much of material was in one of these particular explosions -- I think that information is even included in my report -- and come up with some kind of an assessment. But again, it would be very

crude.

And I think the point is we really don't know the definitive answers to those questions even if we make an attempt to reconstruct something. I think that's the essence of an SEC is that you really don't have the data.

DR. MAURO (by Telephone): This is John Mauro. I seem to recall in the earlier report where you have some data not necessarily associated with the explosions but associated with, I guess, just airborne samples collected during operations. And even when there weren't -- my recollection, please correct me if I'm wrong with that -- even during routine, non-explosion time periods the dust loadings were fairly high.

And I recall your citing some airborne concentrations and associated dose rates to various organs over short periods of time that were fairly high. I realize this doesn't go toward the explosions, but the implication would be, well, you would expect whatever the exposures were during the explosions that they may be substantially higher than the ones that

they observed, what you would call more or less routine operations.

DR. BEHLING (by Telephone): Yeah, John, you're making reference to the 1963 AEC Inspection Survey. And of course, these were non-radiological events, and you had very, very high airbornes even during routine, which during the event of an explosion would have even been further amplified due to the suspension.

And so now you have two things, contamination that is part of a routine environment and then after the explosions that would have added to that and also raised the airborne by re-suspending contamination levels that were part of the normal, natural working environment. So it's very difficult to reconstruct everything, but one can certainly conclude that the doses would have been substantial.

DR. MAURO (by Telephone): What level of exposure? I don't recall the numbers, but I remember them being high.

DR. NETON: John, this is Jim. I thought about that before the meeting, and I recall

that when Hans did his calculation for the thorium, I think he took the highest air concentrations that were observed in the inspection at the level of 10,000 dpm or something like that.

DR. MAKHIJANI: No, Jim, they were daily-weighted averages.

DR. NETON: Daily-weighted averages, and they were high, but SC&A has a practice of always couching things in terms of 50 year doses which, of course, are not really applicable here. It's really comparing apples and oranges.

So I've gone back and generated a table. I don't have it to hand out, but I can sort of describe. If one looks at thorium exposures and really calculates the annual incremental doses that occur from those types of exposures, say like a hundred, two hundred gram lifetime, 50 year dose to bone surfaces which is, you know, SC&A always maximizes these things, typed, you know, soluble, thorium, 50 year dose, that sort of thing.

You end up, it turns out that you rarely get more than one percent of the total

dose in any given year for those exposure scenarios, for Type M anyways. I think when you get into Type S it might be a couple percent, but what I'm saying is if you can come up with a 200 rem dose, which sounds large, in equivalent to a criticality, that would be delivered over 50 years. And the first year dose would be somewhere on the order of two rem.

DR. MAURO (by Telephone): That's helpful information. That's why I brought it out.

DR. NETON: And I think we need to concentrate, focusing on that issue because we can't be comparing 50 year doses. If a cancer develops ten years subsequent to the exposure, the 50 year dose is irrelevant because the extra 40 years of dose doesn't contribute at all to the development of the cancer.

DR. BEHLING (by Telephone): Well, I agree with you, Jim, but you're also minimizing it now by assuming it's ten years as opposed to 23 years.

DR. NETON: Well, I'm not saying it's that, Hans. What I'm saying though is a 50 year dose is a protracted dose that's delivered

over a large period of time. The equivalent weighting factors that are used for the risk models are very different. It's not equivalent. It cannot be directly compared to a criticality event that happens instantaneously and delivers 200 rem to, matter of fact, all organs which contribute more compositely to the risk than an individual organ is irradiated at 200 rem. It's a very different risk value there.

DR. MAKHIJANI: Just for the record --

DR. BEHLING (by Telephone): I won't disagree with you, Jim. We obviously used the 50 year committed effective dose equivalent because it was the convenient tool, and we don't really have a timeframe that might be representative. It's an upper bound value. That's clearly the case.

But it also has to be recognized that this was from everyday working environment at certain locations that are credibly done by the AEC who was there not to do anything other than to assess the conditions as they saw them in 1953. And this was an exposure for a single eight-hour work, or nine-hour workday.

So the doses were substantial for routine radiological exposures.

DR. NETON: All I'm saying, Hans, though, is you need to consider. Is this an exceptionally high exposure comparable to a criticality event? I think we tried to flesh that out in the last meeting where we started to identify certain scenarios that would reach that bar, that level of exposure.

DR. BEHLING (by Telephone): And we did not include that issue in this report as you know. We avoided the issue of routine working radiological conditions where this reports focus strictly on the radiological incidents for that region.

DR. MELIUS: Hans, Arjun next and then Paul, please.

DR. MAKHIJANI: Let me just say something for the record and then something from my notes in the last meeting. We've never used Type F thorium in our calculations.

DR. NETON: There is no Type F thorium, Type M.

DR. MAKHIJANI: You said Type F, I believe.

DR. NETON: That's soluble thorium which

would be M. There is no Type F thorium.

DR. MAKHIJANI: We've used Type M and Type S. Just for the record, we've used both.

From the last meeting the notes I compiled and circulated in the Nevada report indicate -- and we'll have to go back to the transcript to see who said what. But this is my recollection that we had a discussion on the very point of internal doses, and the qualitative things that were put forward where the internal dose or intakes would be regarded potentially as comparable to exceptionally high exposures in the rule were substantial fires like the one at Rocky Flats in '69 or intense thorium fires at Fernald.

High intake potential, for instance, during maintenance or other limited duration operations that were not monitored like the 18,000 MAC at Fernald during a maintenance operation if the workers were not monitored. And significant failure of radiological controls associated with an incident, for example, sending people to work in a contaminated environment that had not been cleaned up or failures of interlock systems

resulting in high exposures.

So those were some of the examples that were mentioned that I compiled and circulated some time back for internal from the last time. Of course, it's very difficult to say whether the blowouts would be comparable. There were lost of blowouts at Fernald, and I would suggest that the reason you were saying there were evacuations at Fernald.

There were evacuations if I remember right, and so the dust levels presumably would be such that work, in the '50s anyway, would not be regarded as normal in those circumstances. And so I would think that the doses without a calculation should be assumed to be considerably higher than daily-weighted average routine anyway. So, and here the work -- I don't know that that's the case.

DR. NETON: When you have a discrete event that blows something in the air, and uranium's a fairly heavy metal, that settles out quickly in my experience.

DR. MAKHIJANI: Yeah, but work was continuing --

DR. NETON: I understand, but if it settles out over a period of minutes, an hour or more, exposures are down versus a daily-weighted average which is a constant process that's continually re-injecting material into the air. I don't think that --

DR. MAKHIJANI: That is really a speculation on what fraction of the material is fine particles and what fraction of the material is heavy particles. And if you've got a 60 kilogram blowup, you know, then you have to go to the size of the room and the kind of a scenario that Hans has talked about. I mean, I'm not opposed to going to those kind of scenarios, but at the end of the day if you have first, your dose of four rem from such a scenario, can you say that it's not 20 rem? Can you bound it within an order of magnitude? I don't know. I mean, this is maybe a judgment --

DR. NETON: Correct, but even at that level does it get to the, get to that test of the exceptionally high level of exposure equivalent to a criticality?

DR. MAKHIJANI: That's my point; that's my

point. If you get to four rem in such a calculation, can you say that I know that it's not 40 rem in the first year? Can you say that? And at the end of the day that's the kind of judgment that you have to make if you do a calculation. But I think maybe some utility of the idea of the calculation, there's no harm in doing it, but I don't know what the utility of it would be.

DR. MELIUS: Paul, you've been patient.

DR. ZIEMER: Well, there's two pieces to this though. I think we've talked a bit about them, but I'm going to go back a moment with the frequency issue. I do think in a sense it's important if we can establish, for example, let's take the extreme. There was one fire or one blowout to it's happening twice a week for five years. It's somewhere in between there.

I don't know if we know, do we know for sure that it was -- to use Hans' words -- regular throughout this time period? Or is it like the first rainbow trout that I caught which is about 18 inches long when I caught it, but actually when I tell my kids about it

now it's closer to 50 inches long. It grows every year.

A lot of, and I've seen it in my own institutions. A lot of events become more and more spectacular. I just want to know how well do we know sort of this frequency issue, if we can get a handle on it. Is it like once a month? Was it a weekly thing?

Hans, maybe you can address that in a moment, but I'd like to get a feel for the extent to which we can say that this was applied to people throughout this time period.

Then the other part of it, I really am interested in the sort of short-term dose. Now I've seen, in fact I can think of a case where I had a worker who had an incident where basically his full sample became airborne, and he was in breathing that sample and received, and we had great dosimetry because we can follow.

We followed urine. We did whole body counting. We did nose swabs, and so we could pretty well determine his dose in the first year. And it was in the range of 20 rem to the chest or to the lungs. And that was an

incident that occurred in just a matter of minutes. So these things can occur, but in that particular case, he had to have a curie of activity become airborne in a very enclosed space.

It seems to me that if we have some source term information and make some assumptions, we could sort of at least get an order of magnitude idea of whether we're talking about millirems or multiple rems or rads if you want to do it in rads or sieverts and greys. But it seems to me it would be somewhat helpful to at least be able to say more than we think the dose was high because it actually is pretty hard to deliver real high doses by inhalation in short periods of time.

And you can go back and look in the literature, and there's a lot of cases where people are exposed, where we know of the dosimetry and know the source terms. And it's surprising the small fraction of the total source term that it's possible to ingest in even minutes or longer.

DR. BEHLING (by Telephone): Let me respond

to the issue of frequency. I think there's no better testimony that has greater strength than that from himself. And as you saw in the first draft report and the second one, I quoted directly from interviews so that at least one of the hallmarks of his comments that is documented in a number of reports was the day of six explosions in one day.

And so when you have six explosions in one day, the likelihood that you have other explosions, perhaps not as frequently as six in one day, but certainly others on a routine basis is something that you have to conclude. And that is supported by other documents that involve interviews with former workers. And I believe has also accumulated some additional information, and I'm not sure whether he went into the library to get some archived data that would support that notion.

So the likelihood of a large number of these events is something that I don't question at this point. Whether it's once a week, once every two weeks, I don't know. And it's possibly correct when you say that with time things do get embellished, but even if

they were to occur once a month, I think that that would still be a sufficiently frequent event that would affect people with less than 250 day work employment.

DR. MAKHIJANI: The interview in your, in the appendix, , his recollection from the '50s is that was on the order of once a week. My recollection from earlier, looking at the earlier period when we first did the Ames evaluation is in the early period blowouts were possibly more frequent than that.

DR. ZIEMER: Yeah, I would think that they would have taken some steps to mitigate that and so normally in a facility like this you would expect, aside from regulatory things, that people would take steps to mitigate that kind of event.

DR. MAKHIJANI: Yeah, and that's why the six in a day, I think, was during the Manhattan Project or very close to it. Yeah, it was.

DR. MELIUS: Larry, then Gen.

MR. ELLIOTT: , I don't know if he's on the line because he told us he had clinic today, but he would try to visit us when he

could, sent yesterday or day before yesterday some lab notebook pages that refer to just what you mentioned there, Paul, that they were trying to take steps to mitigate.

There are actually, I think there's one reference there to putting a steel band around the bomb device itself so that, you know, it'd try to contain the contents even further. But be that as it may, I couldn't decipher from that set of notes in the lab book how frequent these occurred.

DR. BEHLING (by Telephone): Yeah, you're correct obviously in the sense where the early period was an experimental period. The use of wet lime was one of the major causes for these explosions, and I'm sure that with time they learned lessons that would reduce the number. But the interview involves periods of time that were towards the final end, so in the early '50s. So if he still recalls once a week, then it's possible that explosions earlier, in the '40s, might have even been at a higher frequency.

DR. MELIUS: Gen.

DR. ROESSLER: The interview that was

included in Arjun's report but didn't come through as a PDF; he has just now sent it to us, and I've gotten it. And I've glanced at it. This was the 1961 interview, and I haven't had a chance to look at it in detail. But just looking at it and comparing it to the interview, I think has at that time much more recall of the details of what was going on. So I think that's an important one to look at. And again, I haven't had time to look through it and myself evaluate the frequency issue, but if you can get it, you might want to look at it.

DR. MELIUS: Can I suggest as a way to go forward, I think there, I think we've, well, one is we need to, it would be helpful recognizing though how the uncertainty involved with it and the fact that we don't have a sharp cutoff to deal from is to do some sort of estimate. What's the potential magnitude of these exposures from an incident?

And then the second issue is can we pin down more what is the frequency of these incidents. Again, probably the estimated incidents, the nature of these events that

occur over time, starting with early on the facility up and over the course of the SEC to that. And I think we have some more newer information that may help with that.

Again, albeit it's not going to be, you know, we don't have complete incident reports. It's going to be generally based mostly on people's recollection. Would that be helpful? Because I think if we have an estimated magnitude, we can talk about that issue. Do these qualify? Does an incident qualify? And then so to speak, secondly, would be over what time period does that qualify and would that make sense based on what we can, what little information we may have on the incidents.

DR. NETON: Right, and that kind of almost could bring you back to square one, which is are these incidents reconstructable. If there is enough background information on these incidents and can put your hands around it, then it may be that the people with less than 250 days have a recourse which is we have an approach to reconstructing their doses.

Because all we said in the original

one was for routine exposures, these non-incident exposures, the current exposures, we can't reconstruct the dose because we didn't have enough monitoring information. But if it's identified, fairly definitively that there were x number of incidents and no more, and one developed a model, it comes to my mind that these explosions happened fairly routinely at many uranium facilities where we have particularly robust monitoring data for urine and such.

And my recollection remembers seeing the types of levels of internal exposure from these incidents that can be speculated based on worst case scenarios. That doesn't mean it necessarily follows that it applies directly to Ames, but there may be some ways of looking at that and coming to some conclusions.

DR. ROESSLER: I think one of the things that we have to keep in mind as we look at this 250 day topic we're talking about is we're not talking about one facility. All facilities are going to be different. But what we have to do, I think, in fairness to everybody is to set criteria that can be

followed as we look at other facilities. Now we have to keep the whole world of facilities in mind on this when we do it.

DR. MAKHIJANI: I'm a little bit confused by what Jim just said, and you just said, which is that if you can somehow put your arms around the dose reconstruction for the incidents, then the less than 250 days will no longer be in the SEC. Now I thought --

DR. NETON: No, no, no, that's not what I said.

DR. MAKHIJANI: That you could reconstruct their doses and then they would not be included in the class.

DR. NETON: They're not included currently.

DR. MAKHIJANI: They're not included currently, and they would not be included because you could reconstruct their doses.

DR. NETON: We would reconstruct whatever we could for the less than 250 days. Right now we say that we cannot reconstruct routine exposures because that's what we identified as the exposure pathway for these folks.

MR. ELLIOTT: If we can put a maximum bound on these incident-type exposures, we could use

those in our partial dose reconstruction.

DR. NETON: Partial dose reconstruction.

DR. MAKHIJANI: So that's one clarification, but I thought we were talking about health endangerment which is separate from the dose reconstruction piece.

DR. NETON: Health endangerment only applies after you had agreed you can't reconstruct the dose.

DR. MELIUS: Yeah, but Jim, if you can't reconstruct part of the dose, then you don't meet the accuracy, sufficient accuracy criteria because the, again, the --

DR. NETON: Well, we need to talk about that.

DR. MELIUS: Yeah, let's talk about it right now because it's critical here because --

DR. ZIEMER: Well, no, if they can reconstruct part of the dose and it's sufficient for someone with less than 250 days to show that they have a POC of 50 percent or greater, then that's sufficient accuracy for making a decision.

DR. MELIUS: Correct, but not sufficient accuracy for someone that's potentially in the

SEC. If the increment of dose, and we went through this at the first meeting we had was this issue of if the incremented dose that you can't reconstruct could put them over the 50 percent, then that, you know, I guess fails the sufficient accuracy test in terms of full dose reconstruction for the class.

DR. NETON: I don't know about that. We'd have to, I have to think about that because really what we're talking about here is adding, essentially adding a class of workers based on exposures to incidents, discrete incidents. And we're trying to apply that litmus test based on our regulation. Now these discrete incidents as Hans has talked about, they're there. They're out there. Now we're saying do we know enough about these incidents to say that we could do them or we can't. And we could do them if someone wants to propose a class that has --

DR. ZIEMER: If you knew the frequency then it would be much less of an issue. My guess is this frequency issue is not going to be solvable. We're not going to know that very well.

DR. NETON: I don't want to prejudge that. All I'm saying is that we have added originally a class at Ames based on 250 days which is the default criteria because our evaluation did not identify any discrete incidents that would result in exceptionally high levels of exposure equivalent to criticality. That's all we said.

So now we're evaluating is there a discrete incident out there that would create another class which would be eligible for SEC based on less than 250 day exposure. And in fact, essentially if we say it's a discrete incident, anyone with any presence at that incident, one minute, would become eligible in that class. But I think that would need to be evaluated in the context of can you do these, can you do a dose reconstruction.

DR. MELIUS: But we define the original class base that we couldn't reconstruct their quote/unquote routine exposure. So there's still, we still cannot reconstruct an individual's complete dose with sufficient accuracy, and they pass that test.

DR. NETON: The 250 day requirement applies.

DR. MELIUS: Two hundred and fifty day, but then the question is do they, I mean, it doesn't branch, I mean, the branching is, originally it's sufficient accuracy. And then if not sufficient accuracy, then the question is, is it 250 days or is it the discrete incident, you know, was less than 250 days.

DR. NETON: That's what I'm saying. If we can identify discrete incidents that are less than 250 days that result in exceptionally high levels of exposure, then there's a case to be made that they would be added.

DR. MAKHIJANI: Well, let me ask maybe a simpler question because I'm getting a little bit confused about the statements that you've just made. Are we talking about generating a whole new class of people? You've looked at Ames, and you've decided that you could not reconstruct internal dose. I mean, I don't know exactly what, just opened the petition evaluation report to see exactly what it says. But I don't believe you ever made the claim that you can construct some piece of the internal dose, in the evaluation report.

MR. RUTHERFORD: I think we said uranium.

DR. MAKHIJANI: You said you could not reconstruct thorium dose. I don't believe you made any claim that you could reconstruct thorium incident dose but nothing else, but not the routine dose.

MR. RUTHERFORD: No.

DR. MAKHIJANI: I think it generally covered some piece of the internal dose.

MR. RUTHERFORD: That's correct.

DR. MAKHIJANI: Thank you for jogging my memory. Let me just ask the question because I truly am a little bit at sea now as to what just happened. What I thought we were talking about is the same category of workers who are only differentiated from the rest of the workers by the fact that they had less than 250 days. So we're past the stage of whether we can reconstruct doses for this group of workers or not and talking about whether their health was in danger.

Now if that's not the case, and we're talking about a whole new SEC petition then I'm confused about that.

DR. NETON: No, it's important to point out, Bomber pointed it out in reminding you that if

we said that we can reconstruct uranium doses for these workers, then this whole discussion does evolve, particularly in the area of the bombs for the uranium that Hans has just provided a write up, evolves on can we reconstruct those incident doses or not and whether they, you know, if we can, then the 250-day issue is --

DR. BEHLING (by Telephone): Well, let me add one comment to that. Even if, let's assume, we take a single event and reconstruct doses and even bound that dose, the second question that you have to answer is how many events would a person with let's say even two months of employment would have experienced.

And that's a question you cannot answer because unless you have the full documentation about the incidents and when they occurred, you can't, you can bound maybe one incident, but you can't identify the total number of incidents per unit time that a person might have been exposed to, and therefore, you're still in a situation where you can't answer the question about the dose for persons less than 250 days of employment.

DR. NETON: I don't know that, Hans. I mean, that would have to be evaluated, but you've got some statements from some workers talking about frequencies and such. I mean, you were very positive about some numbers at one point I thought.

DR. MAKHIJANI: Well, the order of magnitude ideas.

DR. NETON: Yeah, but can that be a bounding analysis? I mean, that's --

DR. MAKHIJANI: How can it be? If somebody recollected -- I'm really confused by the drift of the discussion. I need some clarity here. If you've got somebody recollecting that it was about once a week and in the '50s, and then others saying maybe it was more frequent in the '40s, there's a lot of element of recollection and uncertainty and speculation in that generality. And then how you would possibly go from that to an individual, even in principle, let alone doing more interviews and so on, is puzzling me a great deal, and still meet the criterion of 42 CFR 82 which says that under no circumstances will an individual be harmed by any level of

uncertainty.

DR. NETON: I'm not sure if it says exactly that.

DR. MAKHIJANI: I think it says exactly that.

DR. NETON: I think you're paraphrasing very loosely, Arjun.

DR. MAKHIJANI: Well, no, I am not. I will read it to you. Let me pull it up.

MR. RUTHERFORD: I would like to add something on the class.

DR. NETON: I think it says something about providing reasonable dose reconstruction.

DR. MAKHIJANI: Let's pull it up.

MR. RUTHERFORD: Dr. Melius, can I add something?

DR. NETON: Yes.

MR. RUTHERFORD: I think what's important on the class is recognizing where the blowouts occurred. If, you know, we've identified virtually all of Ames where they were potentially exposed to radioactive material. The class was defined because a routine or potential exposure thorium internal exposures from the bombs in a blowout standpoint we can

clearly identify which buildings where bombs or blowouts would have occurred, and therefore, that's a completely different class definition.

DR. MAKHIJANI: Could I just read this for the record?

DR. MELIUS: Yeah, that has potential. And actually, when you said if the, only exposures from the incidents were things of a nature that you can reconstruct, I mean, so hypothetically then that would be different. I agree with you there. I think the question then comes down is the nature of the information, does it allow you to reconstruct and some of that stuff.

DR. NETON: I'm not saying that we can't. Don't get me wrong. I'm not saying that we can do that. I'm just saying that you have to follow the steps in the regulation which have a very prescribed process.

DR. MAKHIJANI: Could we settle what's in the regulation? Let me just read from it.

Forty-two CFR 82: "Claimants will in no case be harmed by any level of uncertainty involved in their claims, comma, since

assumptions applied by NIOSH will consistently give the benefit of the doubt to claimants, period. Hence, comma, the level of uncertainty is not an issue whenever there is a sufficient factual basis to establish the radiation source type and quantity and a basic understanding of the process in which the employee worked, period."

So the --

DR. NETON: That's the preamble, not the regulation. That's not part of the regulation.

DR. MAKHIJANI: This is the promise to the claimants that you've made in your final rule, that claimants in no case will be harmed by any level of uncertainty. And this is the commitment, I mean, so in that case I think I need to be informed about what is the meaning of the commitment that you make to the claimants, in the ruling you say that they will not be harmed. We've been trying to interpret it by saying that there's a probabilistic interpretation of the statement.

DR. NETON: Well, what's the question about harming the claimant now?

DR. MAKHIJANI: Well, if you cannot, how can you translate a recollection of 50 years ago? We can develop a general idea that blowouts were very frequent. They may have been daily or weekly or monthly, but how could you translate that kind of information to an individual dose reconstruction in this context?

DR. NETON: Arjun, I said we would have to evaluate that. I didn't say that we could or we couldn't. I said that that's the first step in the evaluation is, can you? If you cannot, then you go to the next test which is were these exceptionally high levels of exposure. There's a couple little, you know, there's a pathway that needs to be followed.

DR. MAKHIJANI: I'm just looking for clarity on the confusion.

DR. MELIUS: I think to move on with this I think we're back to those two points. We need to estimate the magnitude which we talked about, and we need to gather more information on frequency. So if SC&A can work on both, and then, Jim, if you can bring to our next meeting your table of whatever you've done. I

don't want to, I can't exactly recall what you --

DR. NETON: Oh, the 50-year dose?

DR. MELIUS: Yeah, yeah, you said you had some of your own calculations. Maybe we can just bring that so we can discuss that. And I think that, and I guess my next question is there other information that would be helpful to further the discussion on this?

DR. ZIEMER: I just want to get a feel for this. Are we saying that we'll take either a fire or blowout incident source term information? Do we have reasonable source term information?

DR. NETON: The charge in the --

DR. ZIEMER: And let's suppose that SC&A and NIOSH agree on what some reasonable parameters are, and we make user friendly, some claimant friendly assumptions about percent airborne and the particle sizes and related parameters and come up with some number. And at that point then we'll have to do something with it.

Suppose that number is that everybody agrees that in a blowout nobody could have gotten more than let's say 100 millirem or

maybe it's 100 rem. I'm just taking some extremes. It probably won't be that clear cut, but if everybody agreed that it was a small number, then where are we on this? Then you would have to say you've got to be present at x number of these or if it's a big number maybe one will do it. But at some point the only thing that's going to tell us is how important is an event. Or is it an event?

DR. MELIUS: How potentially important is an event.

DR. ZIEMER: And maybe we can't do it. Maybe we can't do it.

DR. BEHLING (by Telephone): I want to make a comment here because if there are any real data involving blowouts at other facilities, you have to be very cautious here. One of the things that we've learned when we read the documents, especially that of Dr. Payne in a thesis, is that these buildings were never intended to be used for this kind of process. So that if you look at Fernald and other places where these blowouts may have occurred, these facilities, other facilities, were probably designed to deal with that in terms

of ventilation and other factors.

This was an old chicken coop or whatever it was that started out. And when they started the actual process itself, they went down to the local hardware store and bought huge ventilators in order to keep the workers, the production workers, cool. So that we're dealing with a very unique beast here in terms of trying to understand what potential airborne exposures were because they were probably amplified, especially in the early years, by the poor construction and engineering design of the buildings.

DR. ZIEMER: Well, and that's fine. Let's take that into consideration. I'm just, even if we ultimately can't use it, it seems to me that it makes more sense to at least have looked at some scenarios rather than say, well, just intuitively the number is high or the number is low.

MR. RUTHERFORD: Quick question here, question, thought, whatever. But doesn't it ultimately come down to what dose per unit time we're going to agree to the critical organ is equivalent to the criticality.

DR. ZIEMER: What's hot.

MR. RUTHERFORD: And if you know that, if you can agree to that, then you could back calculate the intake if you could agree to what that dose is. And then you could say, okay, is it plausible? Is it feasible?

DR. MELIUS: But if we had agreed to that, we would have had a different regulation, and so that's why we're --

MR. RUTHERFORD: I'm just throwing that out.

DR. MELIUS: Yeah, we're working from, it's a nice thought, but, okay. And I think the second part of it is the frequency over time and location of the incidents which would help us to define a potential class.

DR. NETON: I totally agree that fleshing out this blowout is a good start because otherwise we're talking from generalities. I don't know where it's going to come in, and of course, we should include all the uncertainties. I agree with the uncertainty issue there that Arjun has raised. We need to be cognizant of that and what could it have been, given our lack of knowledge of the process.

But I also know that we have done a lot of uranium analyses in this project so far, and there are certain dust loading factors that one, I think even SC&A and NIOSH would agree, one probably wouldn't exceed and be able to survive the environment. And some of those assumptions could come into play and the durations that might have occurred and knowledge of settling of uranium material is blown into the air. There's some factors that can be used to bound these things I think fairly well. We'll see how it comes out.

DR. MELIUS: Any other words on Iowa?

DR. WADE: Who's doing it?

DR. MELIUS: SC&A will, yeah, I think it may be helpful if there were some sort of technical call between Jim and Arjun and Hans to sort of work out the parameters so we all agree when we come into the next meeting.

DR. MAKHIJANI: Just for clarity I made some notes, but let me read out the notes about the to-do list so we have some agreement.

DR. ZIEMER: Maybe some of us could listen in on that call, too.

DR. MAKHIJANI: Yeah, fine, yes.

There's the question of the number, the frequency of incidents so that's one issue to research. And then there's the question of having some kind of dose reconstruction model for one incident, taking into account the kind of circumstances that Hans has pointed out. And what Jim just said in terms of our prior agreements about maximum breathable environment for a routine.

DR. ZIEMER: Is there a blowout and a fire?

DR. MAKHIJANI: Well, there were fires and blowouts.

Hans?

DR. BEHLING (by Telephone): Yeah, one of the things that I would recommend is to perhaps look at Figure 1 on page three of the most recent report. That gives you a flow plan of Little Ankeny and realize just how small these facilities were and the proximity to not just the workers who may have been directly involved, but also all workers within that building. It's a relatively small building and one could make use of that as the starting point for modeling such an exposure.

DR. MAKHIJANI: There's no scale here, Hans.

DR. BEHLING (by Telephone): Well, I think we can probably get to that scale by looking at some of the photographs of Little Ankeny.

DR. NETON: Yes, we have that.

DR. MELIUS: Gen.

DR. ROESSLER: Is it clear which buildings were used for uranium and which were used for thorium?

DR. MELIUS: Yeah, so I think it's frequency over time and place and nature of the different incidents.

DR. NETON: My recollection was that we did have urine data --

MR. RUTHERFORD: We have uranium urine data.

DR. NETON: Uranium urine data for these workers. I don't think we --

DR. MAKHIJANI: Some.

DR. NETON: There's some.

MR. RUTHERFORD: It's actually a detailed study that was done, whether it's accurate or not --

DR. NETON: It may or may not be useful to incorporate into the analysis because that certainly provides some bounding, potentially bounding, scenarios. My recollection was that

we did that at Mallinckrodt. We had a fair amount of urine data in the later period, and the incidence of the explosions just didn't seem to come to the level of body burden that one would, one could speculate on a worst case scenario.

DR. WADE: One last thought, if there are technical calls, I would suggest that we invite .

DR. MELIUS: And I was actually going to say for next work group meeting we should try to schedule so that we know that he and any of the other claimant representatives might be available.

DR. MAKHIJANI: Yes, it really would have been useful to have him on this.

DR. MELIUS: Good.

Yes.

MS. HOWELL: Can I just interject a friendly reminder here? The working group has before it documents that have not been fully redacted for Privacy Act purposes and as such they may include some names of protected individuals. So please just remember that when you're speaking on the record and try to limit

yourself in the names that you say since this is a public meeting.

DR. ZIEMER: Emily, which, are there particular documents that --

MS. HOWELL: The Ames report and the NTS report.

DR. MELIUS: The last two reports.

DR. BEHLING (by Telephone): Can I ask a question regarding that? For instance, the appendix that I took as part of this where I crossed out the name was, in fact, a document that is available. It's in the public domain. Nevertheless, I did cross out the names. Now are other names like part of that Privacy Act? I mean, his name is everywhere so --

MS. HOMOKI-TITUS (by Telephone): This is Liz. I'm sorry. We are not going to have this discussion on the record because we're not going to sit here and say names that are Privacy Act protected, on the record. We'll be happy to have this discussion with you offline. There are names in there that have to be protected. The names that you removed didn't necessarily need to be removed, but

there were other names that did need to be removed. So if you want to have this discussion, we can have it offline, and we can explain to you what names need to be protected.

DR. BEHLING (by Telephone): All right, I certainly --

DR. ZIEMER: Is this document under review now by counsel?

MS. HOWELL: Right, but we're having some timing issues with having enough time to actually perform reviews prior to meetings.

DR. ZIEMER: Thank you.

DR. MELIUS: Do you people need a break or should we just move on to Nevada? Ray needs a break. Let's take a five-minute break.

(Whereupon, a break was taken at 11:06 a.m. and the meeting resumed at 11:17 a.m.)

DR. WADE: Board members on the line?

(no response)

DR. WADE: Mark, are you back?

MR. PRESLEY (by Telephone): I'm back. This is Bob Presley. I'm back.

DR. WADE: Bob and Mark?

MR. GRIFFON (by Telephone): Yes, I'm back,

Lew.

DR. WADE: Any other Board members on the line?

MR. SCHOFIELD (by Telephone): Phillip Schofield, I'm back.

DR. WADE: You're not technically a Board member now.

MR. SCHOFIELD (by Telephone): No, not technically.

DR. WADE: So you don't count against a quorum. So welcome, please stay and enjoy.

Any other Board members?

(no response)

DR. WADE: Okay, we're back on the record.

MR. ELLIOTT: Has joined us yet?

(no response)

DR. MELIUS: Then let's move on to the Nevada report.

NTS REPORT

Arjun, do you want to give a brief summary?

DR. MAKHIJANI: Sure. I just want to read section, in the first section of the Nevada report I just compiled a sort of brain storming session from the last working group

meeting that we had as to what might constitute exceptionally high doses in a set of bullet points. I wrote out some of them earlier this morning.

And one of the things that we discussed at SC&A in preparing this report is that I think we need to recognize that Nevada Test Site and Pacific Proving Grounds, the test sites are very different than manufacturing facilities because the atmospheric testing programs and the vents of the underground tests are by their nature situations where nuclear materials are not confined unlike manufacturing facilities where you're trying to confine the material, keep it out of the environment. By the nature of the operations they're unconfined material.

So it seemed in some circumstances actually quite difficult to distinguish incidents from work-related exposures. And the tritium exposures and the re-entry workers in the '58 to '61 period for the tunnel re-entry workers kind of provides some illustration of that that I'll talk about a little bit later.

There is a definition of an incident from Operation NOUGAT that we discussed at the last meeting that I put it into the report just for convenience here, an accidental or unexpected type of overexposure, and not situations where minor exposures occurred, so excludes minor exposures.

The second section of the report just goes over some data. We did go over the data that Jim Neton compiled and put on the O drive. Didn't have a chance to go over it much, but I had forgotten that it was there. Sorry about that. Also a little bit buried by Rocky Flats.

We looked at incident reports. We looked at some of the claimant data, and we also looked at the question of incidents from the general D and A type of reports that were available and reorganized those from the last set of data that were presented to you to be more useful following on the discussion. And there are four tables as attachments to this report with certain items highlighted that may be relevant because of the involvement of civilian employees.

DR. ZIEMER: Excuse me, are we still looking at the November report or has there been --

DR. MAKHIJANI: No, this is a new report that you should have received yesterday morning. Should I send it to you?

DR. ROESSLER: Paul, I've got it written and on my disk. Do you want this --

DR. ZIEMER: Do you have it on your disk?

DR. ROESSLER: I have it on my disk.

DR. ZIEMER: Can you put it on a flash drive for me, and I'll just transfer it.

Sorry to interrupt.

DR. MAKHIJANI: I looked at the spreadsheets that Jim Neton compiled for the '61 claimants who are not, who don't meet the 250 day criterion. Actually, I had a question about one of them, whether they do or not, but aside from that 26 cases seem to have complete external dose data, and 21 cases did not have complete external dose data. They may have had some. Many had some. And 14 cases seemed likely to have complete data. And I think I agree with Jim's compilation in that. They were missing maybe the last day or the last piece of it, not a significant incompleteness

there.

But so about a third of the claimant population has some, more than a small gap in external dose data. And the question arises how we're going to deal with external dose data gaps in terms of incidents and then external doses in some kind of indicator, at least qualitative during incidents for internal dose even though you can't put a number on it. Then how do we deal with the problem of incomplete external dose records?

There are no internal dose records until 1955. And to the best of my knowledge, and I stand to be corrected because we haven't done all of the research. From what I could gather looking at the reports, it seemed that until REECO took over bioassay monitoring in 1958 that the 1955-1958 interval has a very small amount of urinalysis data. Most of it seemed like nasal swabs.

Is that your finding also? Mine is very preliminary.

DR. NETON: I'm not as on top of this as I should be either, but I think you're correct.

DR. MAKHIJANI: Because in Operation

Plumbbob, and I've given the data from that which was in '57, the nasal swabs were in the thousands, and the number of urinalysis kits that were handed out were in the dozens. And so, and there were a very large number of personnel involved. So I think that really for practical purposes it doesn't seem that there are internal dose data available for most people who were on the site until '58.

DR. NETON: I would agree.

DR. MAKHIJANI: Would you agree with that? And after '58 that there are data on tritium, and there are data on plutonium, and in '61 data on gross fission products were added. Now the site profile says that in '61 when high gross fission product was detected above the control limit, that they did further analyses.

I looked at the records of tunnel re-entry workers where, that were associated with some of the high tritium exposures from incidents, accidental exposures where people did not know that there was a lot of tritium. I could not find data, and I've only done a preliminary screening of the documents and

there's a lot of paper out there.

I could not find follow-on analyses in the case of workers who had more than the control amount of gross fission products in urine. I found plutonium data. I found tritium data. I found gross fission product data, but I didn't find like other volatiles, Iodine-131 or any other isotope-specific photon or beta emitter data following on that. There is gross fission product data in 1951.

We gave examples of some incidents just to give a flavor for what's out there following on the direction that we got at the last working group meeting, and there are few examples. This doesn't cover the universe, but there are some examples. We didn't go farther because I didn't, I really wanted direction from the working group so as not to spend resources in a direction that the working group would not find useful.

There was an exposure, high exposure, during Operation Teapot, rather there was a failure of radiological controls and an incident during the Tesla test where one individual went to ground zero and got a very

high dose. We don't know whether this individual is a claimant or not. In fact, I don't know who this individual was. The type of work could have resulted in resuspension. There was a claimant with a type of work that could have resulted in resuspension, but I did not write the type of work down so as not to involve Privacy issues, that also had some significant, higher than usual, external dose recorded.

The second example was an incident during the 1953 Upshot-Knothole series of tests during the Badger shot. There was, workers were allowed to enter areas that had greater than ten rads per hour to retrieve their instruments.

And according to the Defense Nuclear Agency report, an unknown number of overexposures resulted from the misunderstanding of who was to go where, and people entering high radiation areas when they weren't supposed to because of this misunderstanding. Of course, '53, there are no internal dose data so we don't know what the associated intakes might have been.

Then there was an unplanned criticality incident as a third example during Project 56. I believe this must have been during the test in January because it was the last in a series of four tests in that project. The external doses from that test are known and recorded, and they're cited. They range from 4.3 to 28 rad. And the dose rates were quite high, 20 to 30 rads per hour.

And there are some bioassay data for personnel from Project 56. And we did some dose calculations of committed dose. And we're using committed doses just as an indication, not to say that this is the way dose reconstruction was done, just as a screening indication of whether things might be high or low or worth looking at in more detail. And in this case the plutonium related committed doses to the bone surface, and even the effective dose, are in the tens or hundreds of rem. So that's the third example.

The fourth example relates to the tritium exposures that were unintended. And these occurred over a series of years,

starting in 1958 for tunnel re-entry workers. And there were also exposures in 1959 when workers went back into the tunnels even though there was no testing in 1959. The tritium appears to have persisted for quite awhile in the crevices and cracks and be out-gassing.

And then there were more exposures in 1961. And there's some discussion of, I believe they had one case at least, the exposure was on the order of ten rem from the tritium in 1959. There's quite a bit of bioassay data. The detection limit I think went down from five microcuries to two microcuries per liter between '58 and '61, at least as I read the information, for the five microcuries from the site profile. But in '61 data the detection limit was two microcuries.

Well, there were many samples in the hundred to 200 microcuries per liter range but most were below 100 microcuries per liter and many were below the detection limit. I think in the earlier years where we don't, there is gross fission product data in 1961, but I don't know how one could extrapolate from that into earlier years because the conditions for

each of these entries seem to be very, very specific.

And the testimony that was presented to the Board by is cited, and I have checked that I can say this because it was presented to the Board in open session. And she's actually given me permission to use her records, but I've asked her for some clarification on that permission, and I will send it in to NIOSH and CDC when I get that.

But she had said in the context of her testimony about to the Board that they were asked -- in the context of this tunnel re-entry and the accidental exposures -- that there were workers with high exposures including , were asked to throw away or lose their badges, and that the recordkeeping people had asked for lost badge forms or cards so they could enter a lost badge and issue a new one. I did verify two cases of that from 1962 from log books. And those log books are quoted in the report on page 11.

So they seem to be, it's not definite corroboration, but I think it's indicative corroboration together with what Jay Brady had

said, previously presented by SC&A in the site profile review, about people not wearing badges because they were afraid of losing their jobs or losing work in forward areas. So this has come up because of testimony in the context of incidents because of the tunnel re-entry incidents and exposures to tritium and obviously to, in come cases, to fission products. So that's the fourth example.

As a memo item from the tables there are lots of cases of high radiation rates but not documented who was there, whether anybody was there in some cases. In some cases the high exposure rates are associated with, very high exposure rates are associated with aircraft-type of surveys and people in helicopters over ground zero and so on. We don't have, we have not compiled any exposure data on those and don't know what the internal exposure situation might be. Obviously, there'd be some potential with the helicopters landing and taking off but not much if they were over-flying ground zero unless they were going through a cloud of course.

So that's sort of the survey we've done. I tried to list some policy and technical issues that arise out of these surveys in the sections. And the policy issues that arise out of this compilation of incidents, at least as we saw them, were one of the policy issues that seemed to arise is are we going to look at claimants only or are we going to look at the universe of people with less than 250 days.

We do agree that it's useful and very important to look at the claimant data. But as I've read the rule, it applies to the class of people who worked there and not, so potentially who could apply and may not have applied for a variety of reasons including the fact that they may now be sick with cancer, but they may apply in the future.

So that's sort of a policy clarification that's needed because in deciding what's representative for members of a class I don't know of any way that we've devised yet to relate how the claimant population is representative of the people who worked there. So that's kind of an issue.

Then we recognize that we need, the rule requires demonstration of exceptionally high exposures and mentions criticality accidents. And then in 83.9 the rule also mentions depressed white blood cell count associated with radiation exposure. But this is, when there's an SEC petition application being made on the basis of an incident -- at least as I read the rule, correct me if I'm wrong -- and how the requirement for an application based on an incident is to be related to a context where you already granted a class based on more that 250 days and are now debating less than 250 days, this was a question, at least, that arose in my mind.

And I'm not clear on how that is to be done because 83.13, all it requires is that an incident happened. And presence during the incident doesn't require establishment of potential, establishment of an actual value for the dose other than the criteria for exceptionally high exposures. So that seemed to be a policy problem.

Then, as I mentioned, the integrity of data in the context of the 250-day issue. And

then the final policy question is does the individual have to demonstrate presence or is the presence of one or more of a group of employees, like tunnel re-entry workers or something like that, enough. Now that isn't quite clear to me because, anyway, it's a question that arose out of, say, the examination of, specifically really of the tunnel re-entry workers.

Then the technical issues, there were three technical issues that got highlighted. One --I've mentioned them in passing I think. One is that there are no internal dose data at all up to sometime in 1955. And very little, as I read it in a preliminary way, until about 1958.

Then there are some missing external dose data as an indicator of internal dose for some of the, for about a third of the claimants. So how one might go about, say, using DTRA-type approaches presuming that they would be suitable to be used in this context is sort of unclear to us. And so we haven't yet gone there in any significant way.

And then the records of incidents and

high dose rates and DoD reports don't often provide detail about who all was, were there. And sometimes you actually do see Los Alamos, Sandia and so on in the DNA reports but not always. So the question about how you add small groups of people to the class or whether you're going to be broader in approaching the question, that seemed to arise as a technical problem.

That's my little survey.

DR. MELIUS: Thank you.

Questions? I realize everyone had limited time to review this.

DR. MAKHIJANI: Yeah, I'm really sorry about that.

DR. MELIUS: I'll start off because I've been sort of wrestling with how do we deal with this site, and I guess, again, I'm sort of convinced at least there's potentially some claimants that should be in the SEC class who had less that 250 days there. I think to me the question is what's the best way of going about and trying to identify or, I guess we talked about it earlier, come up with a class definition for them.

Or is the alternative, which I guess I had thought about, was, yeah, well, do you just do these as a series of 83.14s. I mean, is it going to come down to just being able to look at the individual record and whether it's going to be possible to deal with, you know, as those come along that you evaluate an individual and that individual then may define another group of workers that, where it's not going to be possible to reconstruct their doses and they would fit under these criteria.

Because I guess what I'm concerned about is there going to be any sort of systematic way and efficient way of going through all these different incidents and defining classes of individuals that, you know, first criteria for what would be an incident that would qualify. And secondly, a class of individuals from those incidents given how sketchy at least the information available so far is. Or is there another source of data?

The only other source of readily available data that hasn't been looked at is the condition of those claimants that are less

than 250 days. There are a whole bunch of other claimants that NIOSH, at least, has some information on though how rigorous your dose reconstruction was on those I'm not sure simply because you weren't really pressed to do that necessarily on these because of the greater than 250 day class.

So it's a real struggle to sort of come up, what is a workable way of dealing with this group?

DR. NETON: It's a good question. I can answer one policy clarification that Arjun threw out there. I think the answer is pretty easy. His question was do we rely solely on claimant data or not to evaluate these classes. And clearly the answer is no.

I mean, claimant data is a very useful tool. It gives us some general idea about what's out there. But you're absolutely right. The entire evaluation needs to look at the workers who were onsite whether they are claimants or not.

When it comes down to the, you know, Arjun has pointed out a number of little incidents that pop around all over the site,

but my take on this so far, and I haven't studied this in detail. But going through it the best I could, I still haven't seen anything in here that puts people in these exceptionally high exposure scenarios.

Any of these incidents so far I haven't seen anything that puts them into a criticality event. Again, we get back to the question of how high is high, but, you know, three rem, four rem here and there are mentioned. There's some exposure scenarios which were the 39 rem which I couldn't tell whether that was a measured dose rate --

DR. MAKHIJANI: It was a measured dose, I believe, or an estimated dose for that person.

DR. NETON: But given all these scenarios hard to identify, I don't see any that in my mind immediately strike out as passing that litmus test.

DR. MELIUS: But would you agree with me there's the potentials there from this site? I guess what I'm struggling with is how do you go about, how are we going to go about evaluating that other than incident by incident, and it may be case by case. Claim

by claim I guess is --

DR. NETON: Well, it's appealing when you mention that we could handle these on a case by case basis. But then one would wonder can we even to do that? I don't know, so it's a problem.

DR. MELIUS: Larry, while you were, I think you were out of the room, I mentioned that one of the options was do we approach this individual by individual as a series of 83.14 petitions? Do you evaluate an individual claim, and then that individual claim may have been somehow defined, you know, you can't reconstruct that. Then that individual claim then defines another group of workers so it's all tunnel re-entry workers at a certain incident.

MR. PRESLEY (by Telephone): Jim?

DR. MELIUS: Yes.

MR. PRESLEY (by Telephone): Bob Presley, can I speak?

DR. MELIUS: You sure can.

MR. PRESLEY (by Telephone): One of the things that's bothering me more than what Arjun was talking about is the chronic

exposure. We had hundreds of people over the years that spent time out there, that lived out there, either at Mercury or at Area 200 where the prevailing winds blew up over the mountains. What bothers me more than these single incidents in the tunnel shots are the people that were out there that got chronic exposure.

I agree that it's probably low level, but I mean, I hate to say it, but a lot of these people were getting exposure 24 hours a day from the dust that they were living in and when we'd have dust storms, you know, it would uncover stuff and some things like that. And that bothers me more than the single incidents. I thought y'all were going to go in and look at some of that.

DR. NETON: Well, Bob, this is Jim Neton. Remember that the SEC has already been granted for these workers between '51 and '62 or if they were there 250 days or more. That's already been granted or is in process.

DR. MELIUS: And our understanding is that the Department of Labor takes into account residence at the facility. So it's roughly a

third or --

DR. ZIEMER: About 80 days.

DR. MELIUS: -- eighty days.

MR. PRESLEY (by Telephone): Okay, so that's already taken care of.

DR. ZIEMER: The Department of Labor has assured us that they'd take care of that if a person shows they were there 24/7.

DR. NETON: In fact, I was going to mention just tangentially that of the 61 claimants we have with less than 250 days I don't know how many of those would fall under this criteria. We finally did that analysis. We had realized that Labor was going to apply that where some of the workers --

DR. MAKHIJANI: One I think actually has more than 250 days at PPG and NTS combined.

DR. NETON: They're very difficult to decipher. I don't know if you've gone through. I've gone through almost all the claims myself. And you can't really tell because there's a lot of dates there, and they're contractors so they'll be assigned a badge on day one, then they'll show up sporadically, a week, two weeks, a month

later, and you can't tell whether that badge represents that entire time period or whether they needed to have new badges and that actually is those 21 that we just don't know.

MR. PRESLEY (by Telephone): Hey, Jim?

DR. NETON: Yes.

MR. PRESLEY (by Telephone): Has anybody looked for housing records? That's something that they kept out there religiously.

DR. NETON: Not from my, well, I don't know, Bob. I would have to get with ORAU who developed a lot of this.

MR. PRESLEY (by Telephone): See, we all were housed out there, and you had to sign in the keys and things like that so those housing records were kept religiously.

DR. WADE: So the chronic exposure issue has been dealt with. The question remaining are these individual exposures.

MR. PRESLEY (by Telephone): Okay.

DR. ZIEMER: In other criticality incidents we ought to know who the exposed people were. I mean, if you take the SL1 accident or the Oak Ridge, and in fact, many of those we know the doses fairly well, but if someone were

able to establish that they were in that location at the time, under the current rule they would already be covered, right?

If someone were able by affidavit to say, well, you know, at Oak Ridge we have those five individuals, but in fact, I was in there with them, and they didn't do dose reconstruction on me or do the mock-ups or somehow establish that they were there. And what would you do? You would take, what, the highest exposed person and say, well, or something --

DR. NETON: Where were you? How long were you there?

MR. ELLIOTT: The first attempt would be a dose reconstruction attempt based on the data and the information at hand.

DR. ZIEMER: But if they were already part of a, or they weren't part of an SEC, but had an SEC cancer and showed that they were in there at that time --

DR. NETON: Then we would reconstruct the dose.

DR. ZIEMER: -- we would still try to reconstruct the dose.

DR. NETON: A criticality event in and of itself doesn't grant you SEC status.

DR. ZIEMER: I know, so we'd have to try to --

MR. ELLIOTT: I don't believe the criticality event at Y-12 is bounded by the current classes that have been established there.

DR. ZIEMER: No, it hasn't. And I'm trying to think of these tunnel ones where we have a lot of data on people who did go in and the issue is that, yeah, but a lot of times we weren't wearing our badges because we were told not to.

DR. MAKHIJANI: There are a couple of different issues with the tunnel workers specifically. I think for '61 that the tritium data may not be an issue. I don't know how complete they are, but there are quite a lot of tritium data. So that probably can be reconstructed in some way, and there are quite --

DR. ZIEMER: It's hard to deliver real high exposures.

DR. MAKHIJANI: But whatever there is, you

know, there are high-end data and you could put a 95 percentile on.

DR. NETON: The first case we did at the Nevada Test Site was a tunnel worker who was compensated based on tritium exposure.

DR. MAKHIJANI: So what I think for the early tritium, '58 and '59 workers, there are no gross fission product data and so no data on exposure to fission products. And then you drop this issue of data integrity associated with these incidents. So I would say that for the tunnel re-entry workers that those are probably the big ones that you can say are --

DR. ZIEMER: Conceptually, would they have to show that they were a tunnel re-entry person?

DR. NETON: If that were the basis for their class, yes.

DR. ZIEMER: If that were the basis for the class then they would have to show that.

DR. MAKHIJANI: Because the incidents, in principle, or in hypothesis say that exposure to gross fission products, a thyroid dose or something, could be quite high or exceptionally high, then it would be high for

that circumstance. So you would be talking about that particular group of workers I would imagine and not people who didn't go into the tunnels.

MR. PRESLEY (by Telephone): Hey, Lew, this is Bob Presley.

DR. WADE: Yes.

MR. PRESLEY (by Telephone): I've got to get off here.

DR. WADE: Okay, thank you.

DR. MELIUS: Thanks, Bob.

DR. NETON: This came out in the first discussion we had with Ames. It's a unique situation where we've evaluated the class. We've come up with 250-day defaults of the criteria because in our searching through the records, we were not able to identify clear-cut, at least, incidents that rose to the level of exceptionally high on the criticality (unintelligible). And now we're sort of trying to go backwards and retrofit this and say are all these workers now, should they all be covered under the less than 250 days? And it doesn't seem like --

DR. ZIEMER: Or should some of them.

DR. NETON: Yeah, and you can't do that. You almost have to go back to square one and say are there pockets of workers, classes of workers at Ames or NTS that fulfill this criteria.

DR. WADE: What Dr. Paige (ph) was saying.

DR. MELIUS: Exactly, and I'm trying to think what's the best way of getting at this. And it is difficult, very difficult. And I think the evaluation in some way starts from the beginning. I mean, there may be certainly cases where you can reconstruct the doses. I mean, I think you already have in some cases, some just based on what you can do you can qualify. Some you may be able to bound or whatever in a way that's not as appropriate for longer than 250 days. So I mean, it's a real --

DR. NETON: It's problematic for NTS because we've said I think that we can, we have something that we can do with external because we have a large amount of external. There are gaps. We're missing data, but we have a fairly good monitoring, we think, record for that. We have nothing for internal as Arjun

has pointed out accurately.

So (unintelligible) is used to assess those internal exposures, you know. DTRA has gone down the path of using some ratio of the external badge result to the internal. And we have decided in our evaluation report that that would not be useful for our program until we set this point.

So now we're sort of in a position where we have no metric to use for internal exposures other than maybe these (unintelligible) where we have some tritium. So how do you know how high these internal exposures were other than that they were --

DR. MELIUS: I will tell you that Arjun and I conversed by, I don't know whether it was by telephone or by e-mail is well do we take the DTRA's effort right now. Because they are, they say they can and use that even if we don't accept it for in terms of sufficient accuracy, do we accept it as a way of estimating the potential magnitude of those exposures that would give us sort of a handle on the endangerment. Is that going to be a useful, would that potentially be a useful

approach? And it may be. I mean, I --

MR. ELLIOTT: Well, aren't we saying in DTRA that we haven't seen the development of their validation of data and their approach yet, and they're working on that.

DR. MELIUS: Exactly, and some of it was a question of feasibility. I mean feasibility in terms of timing and that sort of feasibility. But I think the context in which we were discussing that was having evidence of being able to reconstruct dose with sufficient accuracy. So, and I don't think that ruled out, you know, of the evaluation of what they come up with. And I felt very comfortable when I was talking to Arjun is that that's a possible way to go, make use of --

DR. ZIEMER: I'd like to ask Arjun as you reviewed the material, aside from the tunnel workers, were there some other scenarios like ventings that you thought might rise to that level or as far as exposing workers? The ventings were not really in -- come into play there, but I'm just, aside from the tunnel workers which might be a possible subset, what other subsets are there?

DR. MAKHIJANI: Well, there seem to be pretty high dose rates associated with these flights and helicopters and so on, and maybe the dust that was kicked up. And RAD-safe people who proceeded soldiers into ground zero at very short times after the detonations.

DR. ZIEMER: To retrieve the --

DR. MAKHIJANI: To retrieve instruments and so on. There are a couple of other categories like that. There seem to have been some cases where there were logistical mix-ups like the misunderstanding that I quoted where there were some number of people who were overexposed because they found themselves in a high radiation area when they weren't supposed to be there.

And there is some idea of the external dose environment. Presumably there might be badge data, but because there was a lot of activity there, then you'd be kind of in a place where you have to identify the internal dose. So there are maybe, I'd say from the work we've done so far maybe those three kinds of examples in addition to the tunnel workers I'd say.

Would you consider that a reasonable --

DR. NETON: That seems reasonable. I was just looking at the tunnel worker data that we had collected. Out of those 61 that we had the collective external dose for all those 61 cases were we had badge data was 24 rem, and 58 percent of that was received by the tunnel workers.

DR. ZIEMER: (Unintelligible) dose was 24?

DR. NETON: Yeah, combined. The doses are not very high for the people that, of the 61 left. I mean, yes, there's some gaps, but the highest annual dose was 4.7 rem and that was by a tunnel worker. You don't rise to this huge level. I mean, yeah, they're high exposures by regulatory maybe standards, but as far as --

MR. ELLIOTT: I'm sorry. Those are only on the claimants that we have.

DR. MELIUS: Exactly, and it's also the claimants are less than 250 days, so in some ways --

MR. ELLIOTT: I think those are on the total claimant population, no?

DR. NETON: No.

MR. ELLIOTT: It was just the --

DR. NETON: We've been trying to figure out given that this is a subset. It's going to have no recourse. What are the metrics here, and they're pretty low. Now there are certainly other populations out there as Arjun's correctly pointed out that we don't know about.

MR. ELLIOTT: Well, what's our trouble in getting the full dataset from Nevada?

DR. NETON: We actually do get it. A full, comprehensive dataset?

MR. ELLIOTT: Yeah, like we get from other sites to develop coworker models, et cetera.

DR. NETON: There's tons of data out there. I mean, they provide us a very, if you've gone through their files, they're very comprehensive. They provide us, if a guy who participated in a particular shot, you get the report.

You get a highlighted version of who was monitored with their name highlighted as to what their dose is. They provided us for individual cases, at least, very, I think, a

robust report. I mean, they're missing internal data and such, but I think they've done a pretty good job with that.

DR. MAKHIJANI: The Nevada data are more voluminous in terms of individuals, but I, at least, have not seen for the atmospheric testing period a compiled data --

DR. NETON: I don't think there is.

MR. ELLIOTT: And the point I'm trying to make is the dataset that we're dealing with is pre-selected by those that are claimants. Maybe we're just not seeing the right people come into the door yet.

DR. MELIUS: And my question that I came up with when you were not here, Larry, was would it be useful to expand that database out by looking at all claimants, not just the less than 250 days. At least it would be a slightly larger, or to borrow Wanda's favorite term, a slightly more robust dataset.

DR. NETON: I agree, and I think that's what we would propose to use some coworker datasets.

DR. MAKHIJANI: Not just the 61.

DR. NETON: Really just pull up the 61 to

provide evidence that we don't see the 61 are being singled out.

DR. MELIUS: Yeah, no, that was just --

DR. NETON: They're not treated unfairly.

DR. MELIUS: Since it's not an obvious issue.

Would there be a way of, I'm thinking of, can we focus on three different discrete incidents where we think we have some significant amount of data that would be useful? And then so really examine those in more detail and see where that, you know, does that get us in terms of being able to get a better handle on whether these people and those incidents would qualify under the less, potentially qualify under the less than 250 day scenario. And then it may still if we come back that that's not the full class, that doesn't lead us to the full class definition, but at least I think it would give a path forward to go in terms of how to approach this.

DR. WADE: Might reach up to four class definitions. I mean I think you do need to develop, you said the criticality equivalent

scenarios, some number of them, and then start to take a look at them and see where it takes you.

DR. MELIUS: Yeah, as I say in terms of final efficient, an efficient approach may be to come down to when people make claims it's, you know, because there's so many incidents and so many different potential scenarios there we won't have complete data on.

DR. MAKHIJANI: The one question I have, you know, earlier people seemed to be a little more sanguine about DTRA, but I've looked at it a little bit. And I can't say that I understand all the ins and outs of it, but we do have people who do understand that.

From what I know of it, it seems that it would be not hard to come up with a screening mechanism for the routine exposures where there may be some correspondence between internal and external. But in terms of incident-related, I don't know that I've seen anything, any coefficients or factors in the DTRA analysis where you could apply them to incidents. Now maybe you can tweak them to do that.

DR. NETON: A good point.

DR. MAKHIJANI: I'm a little bit leery, I think in terms of the radiation environment I think DTRA could be used, but in terms -- just now that I'm thinking of it, before you give me this task, and we --

DR. NETON: Yeah, I agree with what you're saying, Arjun. You're right. The DTRA model really is a proximity location model, and if you're near the ground zero or further away we'll come up with some sort of a source term based on their parameters.

DR. MAKHIJANI: And it's an average kind of if you were there.

DR. NETON: I don't know enough to comment whether they do involve incident analyses --

DR. MAKHIJANI: It's something we can look into obviously.

DR. NETON: Yeah, one thing that concerns me though is there's a potential clearly when they're blowing off nuclear weapons in the atmosphere, there's clearly the potential for high exposure of criticality. But I'm not sure that we need to be inventing scenarios that could bring people in. You know, it

almost has to be some credible evidence that it did occur, not could it have happened. The mere potential doesn't --

DR. MELIUS: That's what I'm saying, selecting the incidents. They should be not hypothetical but things that are --

DR. ZIEMER: Actual case.

DR. MELIUS: Yeah, and even then they may not be representative of the particular exposure scenarios or whatever you want to call it for other incidents they may run across in the future.

MR. ELLIOTT: Or representative for the full class.

DR. MELIUS: Right, but if they can help us to, one, is this path worth the effort to go down for more of these incidents and help us in some way define classes or potential classes, and be able to answer. May say, look it, these exposures, you know, we're either going to be able to reconstruct them satisfactorily or they're just not, the magnitude of exposure isn't sufficient to warrant this based on what we've found so far. That's not to say you're not going to find

another situation later that from a claim or series of claims that would do that, but it would --

MR. ELLIOTT: No, I took what you said earlier to be situation, circumstance dependent like the retrieval of the devices or the monitoring tools before the military walked in or marched in and tunnelers who have to tunnel back after the explosion.

DR. WADE: Based on SC&A's research to this point I assume that there were a finite number of scenarios you could identify.

DR. NETON: There are about three --

DR. MAKHIJANI: There were four. There were four that I identified as examples for this. I don't know that I've surveyed the universe, but we have identified four different potential ones. And I think Jim at least agreed that --

DR. ZIEMER: It's the obvious ones, and we should ask that question of those and see where it leads. There may be some others that would arise.

DR. WADE: But you fleshed them out to the degree you can, and then you start one foot in

front of the other, the SEC tests.

DR. NETON: It's not unlike what we're doing --

DR. MELIUS: Right, exactly, the same thing. And then, but I think back to what Jim said earlier is we have to then develop some sort of consistent approach so we're being, treating everybody fairly, and that would also be a way of helping, at least helping to do that. Again, it may not cover every specific instance but at least would give us a framework in which to --

DR. WADE: But your general procedure is not to close the door on anything.

DR. NETON: Yeah, I didn't really capture --

DR. ZIEMER: People, retrievers --

DR. MAKHIJANI: Retrievers and the misunderstanding winding up in high radiation areas by misunderstanding, crossed signals.

DR. ROESSLER: Logistical mess ups is what I wrote down.

DR. NETON: Can we go through those again because I'm not sure --

DR. MAKHIJANI: Well, the tunnel workers, the ground zero retrievers, the over-flight

people, the people in helicopters flying through the mushroom cloud and so forth, and the logistical mix up, finding themselves in high radiation areas.

DR. ZIEMER: Yeah, but that one is a little hard for me to identify. I mean --

DR. NETON: Arjun has one example in here.

DR. ZIEMER: So the person would have to self identify that that occurred somehow.

DR. MAKHIJANI: Well, we found them in the general report so --

DR. ZIEMER: Oh, somebody actually found them there.

DR. MAKHIJANI: No, this didn't come from a claimant record. This came from a Defense nuclear agency report.

DR. MELIUS: Can we then again as the next step would be a technical conference call, whatever we want to call it, that would try to define which of these we would specifically look at and then pursue and then sort of figure out who does what to do that?

DR. WADE: Stipulate what's agreed to about these events. And once you get that body of information, then you start to ask yourself

the questions and see where it takes you.

DR. NETON: It dawns on me that actually I've been looking through a large number of these cases, and it's not uncommon for people to put in their claim application they were involved in incidents and some descriptions, and I think --

DR. MELIUS: That's why I was thinking the other --

DR. NETON: -- I think some of these were, I can actually point one out. I ran across one very interesting one.

MR. ELLIOTT: We actually have one of the over-flight claims, too.

DR. NETON: Yeah, and see I think we have reconstructed those exposures to some extent, and whether we've captured all of the relevant parts would be reviewed I'm sure. I like this approach. I think it's based on a technical evaluation.

DR. MELIUS: Right, and we're not pre-judging. I think these are things that let's see where this gets us, and I think --

DR. MAKHIJANI: So for now then the only to-do item is a technical conference call, and

until that we don't proceed with any analysis. Is that the direction?

DR. NETON: Get started on the Ames --

DR. MAKHIJANI: No, not on the Ames. We're just talking about --

DR. MELIUS: The next step is a technical conference call, and then I think as part of that we need to figure out who does what, and it may be dependent on some other datasets involved and so forth, and --

DR. NETON: And I haven't thought much about these. You guys have a little more --

DR. MAKHIJANI: Well, yeah, sure, and you have to have time to look at it. Is there any preparation for that call or is what you have sufficient?

DR. MELIUS: Only that I think organizing what information you have just to say this is what you know about these four types of incidents, what examples you have.

DR. WADE: Collect everything you have and then dump it across the fence and then everybody's starting from the same --

DR. NETON: I may need to organize the technical (unintelligible) here so that I

don't end up being --

DR. MELIUS: That's someone from ORAU, I don't know who's, I never know who's involved in this stuff so --

DR. MAKHIJANI: So we take that information and try to reorganize it in these four categories. That shouldn't be too hard. We won't try to be all inclusive. We'll just take what we have and reorganize it.

DR. NETON: The idea is to try to identify these scenarios and determine whether we can come up with some dose estimates for these.

DR. MELIUS: What's the magnitude of the exposure? Is it re-constructible? And how would we potentially define a class if it's --

DR. ZIEMER: And if not, why not?

DR. MELIUS: Yeah, why not.

DR. MAURO (by Telephone): This is John Mauro, just a quick question related to that scope of work. Will any of that, those inquiries include exploring this DTRA multiplier where you convert external to internal using their multipliers, and its strengths and limitations?

Because right now it seems we have the

black box, those multipliers that we don't fully understand how they do it for chronic, you know, routine exposure but also the degree to which it might have applicability to incidents. How much of that would you like to see us look into as part of this?

DR. ZIEMER: Has DTRA completed that effort? We need to wait for them to sort of complete that.

DR. NETON: Well, I think their computer model hasn't been updated, but there's been a number of documents issued. I think one of the main issues we had with their approach was the resuspension issue at NTS. And I think there's a paper on that that's been put out by David Kocher, I believe.

DR. MELIUS: Why don't you both look into what's available and then do that as part of the technical call. I mean, you're up to date, and your side gets --

DR. MAKHIJANI: At least collect the papers and --

DR. MELIUS: -- papers and then what's available, and then we can decide is it worth examining that in more detail or for what type

of incidents would it be most potentially applicable or whatever you want to call that.

DR. MAKHIJANI: We can call David Kocher, and are there others that you know are involved?

DR. NETON: Well, we should probably work through DTRA themselves, which is Paul --

MR. ELLIOTT: Paul Blake. I don't know that Kocher's article's been published yet, has it?

DR. NETON: I don't know that it has. I know there's been drafts circulating.

MR. ELLIOTT: As we are they're very cautious to share their pre-decisional work.

DR. NETON: I don't know what the status is. There's a number of documents being worked on that are --

MR. ELLIOTT: Yeah, I think you should touch Paul Blake first.

DR. MAKHIJANI: Would that be a NIOSH to-do then to find out --

DR. NETON: We should probably handle that, determine agency contact.

DR. WADE: One final thought, I think at the upcoming Board meeting -- we don't need to get into the technical details of this, but I

think sharing with the Board the general approach would be very useful. Because this is really sort of ground-breaking stuff. A robust discussion of it should be good.

DR. MELIUS: What is the group's preference? We want to break for lunch or do we want to charge on and try to complete the discussions of the 83.14s?

MR. ELLIOTT: How long do you think that would take?

DR. MELIUS: I never know, but I think we could probably complete it in 45 minutes, about one o'clock.

DR. WADE: I'd say push on.

DR. ROESSLER: You've been a good leader so far. I think we can do it.

DR. MELIUS: Mark, are you still on?

MR. GRIFFON (by Telephone): Yes, I am.

DR. MELIUS: Okay, good now, because you were going to be helpful on this.

DR. ZIEMER: No eating on the side, Mark.

DR. MELIUS: And is the silver medal winner prepared to move on?

COURT REPORTER: Yes, sir, always.

83.14 ISSUE

DR. MELIUS: Just checking. Since I wasn't on the last Board call for longer than about five minutes, I'm not sure how much you explained about the background and what went on. This is for you, Mark, in terms of our evaluation of the Monsanto and General Atomics.

MR. GRIFFON (by Telephone): Yeah, we discussed a little background and some additional documents were posted in that. We had a discussion with NIOSH about some of their rationale. And then I guess that we had the spreadsheets for the conference call.

I think some people at least on the call on the 11th had access to those spreadsheets that Stu Hinnefeld sent around which gave a little more specifics on, I think that was for general comments. I gave a little background, Jim. I didn't go into it extensively, but I gave a little background on it.

DR. WADE: Well, we did stop short of the lessons learned and how that would apply to upcoming --

DR. MELIUS: And why don't we start with General Atomics, and we actually, I think Larry and I had some, LaVon had some discussions at some point. But I was the one that originally had raised the most concerns about the information there.

It grew out of some of the questions that I asked, Paul asked and so forth at the Board meeting. And it was particularly about how it was decided that the class included all the different buildings that were involved that were listed in the evaluation report. And I think that was actually the main question.

What was answered satisfactorily which was how well could you locate people within buildings and so forth. But there were specific questions. I think you, Paul, about the reactor building, and then I think we had questions about the laboratory in particular. And my question was did we have enough evidence on the record to justify including all of those buildings.

And then in response to those questions and discussions we had with Larry

and LaVon and what was available and Mark, these additional tables were made available to us. And I'm not sure if those were new tables or old tables or new tables, what was available. And Mark, these additional tables were made available to us. I'm not sure if those were new tables or old tables or new tables -- new information based on data never been compiled yet. And I'm not sure again if the whole Board got a chance to see those.

DR. ZIEMER: Yeah.

DR. MELIUS: They were circulated?

DR. ZIEMER: We discussed the tables in fact.

DR. MELIUS: Yeah, okay.

DR. ZIEMER: There are a couple which were clarified for us.

DR. MELIUS: Yeah. But I personally thought that part was very useful, and then there was another set of tables, again, assuming this was discussed, which was sort of breaking it down by radionuclide and sort forth, which was also -- at least to me at the time of reading the report, hearing the

evaluation, was not clear.

MR. ELLIOTT: And during the call we committed to adding those tables as a supplement to the evaluation report.

DR. MELIUS: Yeah.

MR. ELLIOTT: Or did I just dream that?

MR. RUTHERFORD: I think you just dreamed that.

DR. MELIUS: Let me clarify, 'cause it was actually as part of the call that you and Mark and I were on, sort of the technical consultation call.

MR. RUTHERFORD: I wasn't.

DR. MELIUS: You weren't, yeah, well I was. And what we agreed to was that these would be given to the Board for our next conference call as a supplement to the evaluation report, so we would get them on the record in some way. And again, I just thought those were very useful and I guess a lesson learned is that I think that type of information is useful either in the evaluation report or you know, as a supplement to the discussion of the evaluation report.

Again, you're in a tough spot, how big and voluminous do you make this, this report?

MR. RUTHERFORD: That's definitely the challenge. The challenge is, you know, I mean 83.13 we typically go into that, we put all of that information in there, 83.14's, and it's definitely a lesson learned, you know, General Atomics specifically, because there were many radionuclides and many other issues besides just the thorium issue that we should have been a little more descriptive on. We should have brought the -- those tables would have definitely made the picture clearer. I agree with you.

DR. ZIEMER: And the final letter, also, to the Secretary has both the buildings where things were done and the exclusions which I think you had --

DR. MELIUS: Yeah, that was in response, actually Pete Turcic sent a note and the table was clear enough that I thought it was useful to add. I wasn't sure it

made it to the final letter 'cause I wasn't on the call.

DR. ZIEMER: Yeah, it did. Actually I hand delivered those letters to Lew today, so they will go to John Howard shortly. And as soon as the minutes are available from that meeting, the package will be complete. And those tables become part of the deliberations also.

DR. MELIUS: Yeah.

MR. ELLIOTT: Part of the lessons that we've learned in this experience also goes to what we have on the open drive for Board and SC&A access to understand our position. We realized that we need to have a specific folder relevant to each case so that you can go in there and you can see all of the information that is used to build our position.

DR. MELIUS: Right.

MR. ELLIOTT: And so we've challenged ORAU and everybody working on these to set aside a folder and if we have to duplicate information from other parts of the SRP, that's fine, but put a

folder that's relevant to each 83.14 and probably each 83.13.

MR. RUTHERFORD: We've been doing it because, the 83.13's, we put together folders for them.

DR. MELIUS: That would be useful 'cause ---

MR. GRIFFON: And on that I agree, but I guess my -- the final tables we got were very helpful because they kind of bridged the gap between initially what was provided on the O drive for General Atomics and Monsanto were all the PDF documents, all the background health and safety reports, et cetera, thousands of pages of it. I guess what I was looking for is something -- and I don't think it necessarily has to be part of your final report to us, but the the analysis process that lead up to okay we've got all these reports, you know in the presentation, you know you make a final summary statement such as there wasn't enough data for fission products to do any kind of dose reconstruction, you

know to handle dose reconstructions. You know, where, where, where's your analysis document that says, you know, we looked through all these health and safety reports, this is what we found, this is why it's sufficient, and this supports our final position on this, you know, something... And I think these spreadsheets for you, you know, at the end it was very helpful to that end, you know, so that's what I was looking for, some kind of analysis of in between the final report and the overall data.

MR. ELLIOTT: Right, right, Mark. I think that's, you know you made a very, very great, substantial comment there, and what we took away from that is that looking at the evaluation report and the summary page, page two or three I think it is, where it has a section that talks about the feasibility, we were not explicit in our analytical position that we were taking, and you know, we've taken that to heart and we will, I hope, not see that happen again as we produce

these documents in the future.

DR. WADE: I think there are two thoughts to keep in mind as to the foundation for what we are talking about. I think it's terribly important that when the Board takes an action, it takes an action upon a record that is complete and goes to all aspects of the issue. Now you might say why worry about 83.14? We're attempting to be generous. But the Board always has to be prepared to grapple with the issues of fairness and consistent behavior, so with that in mind -- It doesn't, not only has to be in the evaluation report, but it needs to be put into the record when the Board is considering these things, so that there is a way to show why it was, yes here, and when someone comes and says well why didn't you do it for me, we have the basis for giving that.

MR. ELLIOTT: You mentioned another good word there, Lew, consistency, and we are, we took that part as well, and we

don't want to be inconsistent, and ORAU has started to put together a table or matrix or something that will start speaking to consistency. It will list all of those that we have treated thus far and show hope, you know, the outcomes of those treatments, and make sure that we are applying the rule in a consistent fashion.

DR. MELIUS: Good.

MR. ELLIOTT: And we'll be ready to show that to you at some point in time; I don't know when.

MR. RUTHERFORD: We have the initial draft already.

MR. ELLIOTT: Bomber's seen it. I haven't seen it. It's forthcoming.

MR. RUTHERFORD: You know, the other thing on the 83.14's that I think is a, you know, a challenge, and I think we came up with a pretty good -- well, not just the 83.14's, but even the 83.13's to a certain extent, I think we came up with a good path forward with the General Atomics and Monsanto and others,

is recognizing that you know we've identified a class here, an issue that we can't reconstruct dose, we can't reconstruct thorium, we can't reconstruct these other doses, you know, that we identify in a report. You know, it doesn't make sense to evaluate every aspect of a facility to an exhaustive process, you know, that's gonna take, you know, a full year to do, when we can identify this class of people that are affected by our inability to do dose reconstruction for a certain -- and then move that forward through an 83.14 if at some later point through our reviews we identify that there are additional issues that add to that class, we move on with an additional 83.14, and I think we came to a pretty good agreement on that.

DR. WADE: As long as you make that very clear to the Board as it deliberates.

MR. RUTHERFORD: Right.

DR. MELIUS: And there are going to be -- You stated different ways, but you

usually say you believe you can reconstruct dose or where you, yeah, and do that, and if it turns out you can't, that may or may not define or change the class definition. In most cases it may not, but there, certainly it's possible, some with multiple buildings or types of processes where it could, there would be additional members that are --

MR. ELLIOTT: Certainly with the large DOE sites that becomes an issue. On the Atomic Weapons Employers' sites where they had a very discrete task, the time frame they were doing the task perhaps, there's not a lot of other ancillary processes, it makes sense to us to move forward quickly with what we can't reconstruct.

MONSANTO

DR. MELIUS: Yeah. Right. Mark, do you want to talk about Monsanto if there are any additional...

MR. GRIFFON: I think we got our bottom line. I'm not sure. I think we've got a good path forward.

MR. ELLIOTT: Just for the record. Monsanto was an 83.13, but yet we, you know, we recognize that we couldn't reconstruct a portion of the dose there and essentially come forward kind of like in a guise of --

DR. MELIUS: Right, right. Many of us were fooled about that. And again, these are ones where there's not been sort of site profiles and so the Board's coming on this site for the first time, and isn't that some of the issue, where there's been a site profile already or discussion of site profile, then I think that's a very different situation in some ways 'cause we have discussed some of the data issues, some of the dose reconstruction issues, so forth.

DR. WADE: I have a procedural question for the work group. Do you imagine that the work group will issue general guidance on this topic to NIOSH and NIOSH will follow it, or will the work group want to screen these 83.14's before the full Board sees them? I'm

not advocating either way, but what's your sense?

DR. MELIUS: I'm not sure how the others feel; I'm not sure yet. I think potentially it's helpful to have a screening process in place for those that are not, again, where there's not background site profile, whatever.

DR. ZIEMER: If there's not already a specific work group.

DR. MELIUS: Right, right, work group involved and so forth. So it's useful 'cause it may identify other issues that need to be clarified and given the amount of time and given the potential numbers of these, that's the other thing that's, I think Larry pointed out at the last meeting. We're potentially seeing a large number and I think in order for the Board to deal with it most efficiently it may be better to have prescreening, so to the extent the work group, or this work group or however we decide to handle it, a subcommittee or whatever, can identify some issues that

need clarification before presentation. Or say that, you know, somebody that's not part of that brings up an issue, say well we discussed that at you know meeting, we're satisfied or whatever.

DR. WADE: I assume Liz is going to raise a caution here? Liz, are you trying to speak?

MS. HOMOKI-TITUS: I was. I was just going to say that if that's going to be a standing direction, you're going to have to set up a subcommittee for it or set up work groups for each individual one.

DR. MELIUS: Which is why I mentioned subcommittee lists 'cause I knew you were about to --

DR. WADE: I thought Liz was going to mention we need to deal with issues of whether or not these are public meetings because we're going to be dealing with issues before these reports have been made public, and the work group or the subcommittee's going to have to decide how it's going to deal with that

information.

DR. MELIUS: Yeah.

MR. RUTHERFORD: Would that be before or would it be re-issue the report to the Board and petitioners and then the work group has a discussion about, or do we actually issue it to 'em as a draft?

DR. MELIUS: I would think if you issue an evaluation report and then we could hopefully time it in a way that this subcommittee or work group, however we decide to go forward, reviews it, and then if the, there was additional information it would be supplemented. I think it's just better if the Board only really has to deal with it once if possible 'cause there's just so many of these, every time we bring it up then everybody has to be refreshed and so forth.

DR. ZIEMER: Yeah, you don't have to change your process, I don't think, and recognize that really this is kind of -- arose as a mirror image of the original cases where you were trying to convince

the Board you could reconstruct dose, and I know I was saying and Mark was saying, convince us that you really can't. Some of these, gee, you ought to be able to reconstruct that, it looks pretty simple.

MR. RUTHERFORD: Sure.

MR. ELLIOTT: My only concern about the time of intervention here is the 180 day mark, but I would prefer that we develop our report and finalize it and then send it to you guys, or the full Board, and you guys take it up, I mean half of the full Board, and do whatever you want to do with it. I'm a little concerned --

DR. ZIEMER: I don't think you want to get us involved in your 180 day --

MR. RUTHERFORD: Yeah, 83.14's, we typically would not get into 180 day issue because -- well I mean we typically keep ourselves on a clock, but we've never really -- because it's an 83.14 we've made the decision, you know --

MR. ELLIOTT: I don't know that I agree

with that. Because you touch a claimant and you say to the claimant we can't reconstruct your dose, we want to go 83.14. In my mind the clock starts right there.

MR. RUTHERFORD: Oh, I agree we do. My point is is that --

(Whereupon, multiple speakers spoke simultaneously.)

DR. WADE: But isn't the process where -- just so I understand the process -- so NIOSH will come out with an evaluation report, then the subcommittee will take a look at it. If the subcommittee finds something, then NIOSH will have to modify their evaluation report.

DR. ZIEMER: Depending on the situation, we may have a work group.

DR. MELIUS: Yeah, there's options, but I also think there's this issue, and we talked about this before, is that the NIOSH evaluation should be independent of the, you know, so you're presenting your recommendation to us, then we take action from there, and you know...

DR. WADE: And it can all be done publicly so that --

DR. MELIUS: Right, and then we also -- however this belief that we make some effort to invite, you know, claimant representatives or whoever to the extent that's appropriate and they're available and interested to participate in this.

DR. WADE: February's meeting will explore the issue of work group, subcommittee, how we want to do this, when you make your report.

MR. RUTHERFORD: Can I ask then, you know, we have a Dow Chemical evaluation report in-house for final review right now that assuming that we don't have any major issues, is going to be out the door.

MR. ELLIOTT: 83.14.

MR. RUTHERFORD: It's an 83.14. It'll be out the door next week. And you know I'm just trying to -- with this mechanism --

DR. MELIUS: Yeah, there's no mechanism right now. What I think is out there,

if you can do this O drive procedure for this, we'll let people know that at the time --

MR. ELLIOTT: I think we can send that report out to the full Board and the petitioners, we set up our O drive as we talked about, and then you guys on this working group can look at it and say, you know, is there something there that you don't understand that we missed the mark on, and tell us what you feel.

DR. MELIUS: And I think we're assigned to do that.

MR. ELLIOTT: And you can even talk about your process.

DR. MELIUS: Yeah, we do that individually. If we have an issue we may want to convene that working group just before the meeting or lunch the first day or whatever.

DR. WADE: We can do that. Excellent. And then you guys will heed the lessons learned when you make the presentation in February.

DR. MELIUS: Yeah.

DR. WADE: We'll be wiser for it.

MR. ELLIOTT: I hope this Dow report, I hope I'm not speaking out of school here, but I'm hoping that this Dow evaluation report will also speak to the residual contamination period, which will be something new that you all have not seen before, and that's why I hope we get your commentary and feedback on it. We are going to face these more and more in our future, and I know there's high expectations among the claimant population about the residual period and what that brings to them.

MR. RUTHERFORD: You know, and this is actually something that we talk to the claimant, or petitioner, about, you know. If for example the 83.14 Dow identifies just the operational (unintelligible) period and it says we can do dose reconstruction for the residual period, that doesn't prevent us from, you know, we can, the Board can approve that class, not agree or disagree on residual period, and request

further evaluation on that residual period. And then it could possibly be an additional 83.14 and then, you know, I'm just throwing that out.

DR. MELIUS: It raises the issue which is, there's no easy answer to, which we talked about a long time ago, with what do you have, you know, somebody that's, you know, 200 days in the 83.14, the period, and then has all this other additional dose later on. I mean it's just a hard, it's a conundrum and we can't... I don't think we're going to solve it here today.

Good. Any other comments on that? If not, we'll close. I apologize on our poor estimate of how long this will take, but I have a 7:50 flight tonight, so it wasn't... expecting to get out of here any sooner.

DR. WADE: It was a very productive meeting.

DR. MELIUS: But appreciate everybody's effort in discussion, and we'll see you back in Cincinnati, or I guess across

the river in Cincinnati, wherever we're meeting, in a few weeks. That's it, thank you.

DR. WADE: Thank you.

(Whereupon, the working group concluded at 12:30 p.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA

COUNTY OF FULTON

I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of January 17, 2007; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 24th day of March, 2007.

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STEVEN RAY GREEN, CCR

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